

DETAILED ACTION

1. This office action is in response to communication filed on 1/19/10. Claims 5-9, 19-23, and 33-37 have been cancelled. Claims 1-4, 10-18, 24-32, and 38-43 are pending on this application.

Response to Arguments

2. Applicant's arguments with respect to claims 1, 15, 29, and 43 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 43 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 43, the computer readable medium as claimed was not described in the original specification and is considered to be new matter.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 3, 11, 15, 17, 25, 29, 31, 39 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285) in view of Howard (US20060209881).**

Re claim 1, Tapia teaches a method for use in an equalization of a channel by means of an equalizer, wherein said channel uses a certain frequency band for a transfer of signals (col. 23 lines 35-43), said method comprising:

determining a channel response for at least three frequency points within said frequency band used by said channel (col. 23 lines 44-59, col. 24 lines 31-39, col. 25 lines 45-55, the P frequency points must be greater than one and it would be obvious to set P to be three or more); and

setting adjustable coefficients of said equalizer (col. 23 lines 35-43, col. 24 lines 13-20) such that an equalizer response compensates the determined channel response at said at least three frequency points (col. 24 lines 28-30).

Tapia fails to teach wherein setting said of adjustable coefficients comprises for an equalization of phase of said channel setting a complex coefficient as a phase rotator part of said equalizer, setting at least one coefficient of a non-real complex all-

pass filter part of said equalizers, and setting at least one coefficient of a real all-pass filter part of said equalizer.

However Howard teaches wherein setting adjustable coefficients comprises for an equalization of phase of said channel setting a complex coefficient as a phase rotator part of said equalizer (§0068, complex coefficients of the filter which are phase rotated), setting at least one coefficient of a non-real complex all-pass filter part of said equalizers (§0039, filters 122 and 124 in fig. 1. It would be necessary to set the complex filter coefficients. Furthermore, since the filter is complex rather than real, it is interpreted to be a non-real filter) and setting at least one coefficient of a real all-pass filter part of said equalizer (§0039, filters 112 and 124 in fig. 1. It would be necessary to set the real filter coefficients).

Therefore taking the combined teachings of Tapia and Howard as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Howard into the method of Tapia. The motivation to combine Howard and Tapia would be to minimize complexity (§0068 of Howard).

Re claim 3, the modified invention of Tapia teaches a method further comprising selecting a number of said at least three frequency points for said channel (col. 25 lines 55-60 of Tapia, P measured points of a frequency spectrum. It would be obvious to set P to be three) to correspond to a minimum number which can be expected to result in a sufficient channel equalization (col. 23 lines 35-37 of Tapia).

Re claim 11, the modified invention of Tapia teaches use of the method for a single channel of a single carrier system (col. 11 lines 15-23 of Tapia).

Re claim 15, the claimed limitations recited have been analyzed and rejected with respect to claim 1. It would be necessary to have an apparatus implemented in hardware to perform the method as claimed in claim 1.

Re claim 17, the claimed limitations recited have been analyzed and rejected with respect to claim 3.

Re claim 25, the claimed limitations recited have been analyzed and rejected with respect to claim 11.

Re claim 29, the claimed limitations recited have been analyzed and rejected with respect to claim 1.

Re claim 31, the claimed limitations recited have been analyzed and rejected with respect to claim 3.

Re claim 39, the claimed limitations recited have been analyzed and rejected with respect to claim 11.

Re claim 43, the claimed limitations recited have been analyzed and rejected with respect to claim 1.

3. Claims 2, 16, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285) and Howard (US20060209881) in view of Stonick et al (US5900778).

Re claim 2, the modified invention of Tapia teaches a method wherein determining said channel response (col. 26 lines 7-29 of Tapia, equation 15) comprises determining a channel phase response (col. 26 lines 22-29 of Tapia) and a channel amplitude response for said channel (col. 24 lines 59-63 of Tapia, it would be obvious to determine the amplitude response), and setting at least one adjustable coefficient of said equalizer (col. 23 lines 35-43 and col. 24 lines 13-20 of Tapia).

Tapia fails to teach wherein an equalizer amplitude response approaches optimally an inverse of a determined channel amplitude response for all considered frequency points and that an equalizer phase response approaches optimally a negative of a determined channel phase response for all considered frequency points. However Stonick teaches wherein an equalizer amplitude response approaches optimally an inverse of a determined channel amplitude response for all considered frequency points (col. 2 lines 57-60, it is well known that an equalizer is comprised of filters and performs predistortion) and that an equalizer phase response approaches optimally a negative of a determined channel phase response for all considered frequency points (col. 5 lines 14-18).

Therefore taking the combined teachings of Tapia and Howard with Stonick as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Stonick into the method of Tapia and Howard. The motivation to combine Stonick, Howard and Tapia would be to compensate for non-linear amplitude and phase distortions (col. 3 lines 65-67 of Stonick).

Re claim 16, the claimed limitations recited have been analyzed and rejected with respect to claim 2.

Re claim 30, the claimed limitations recited have been analyzed and rejected with respect to claim 2.

4. Claims 10, 24, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285) and Howard (US20060209881) in view of Vanderhelm et al (US20030224751).

Re claim 10, the modified invention of Tapia fails to teach setting said adjustable coefficients comprises for an equalization of amplitude of said channel setting at least one coefficient of a symmetric 5-tap Finite Impulse Response filter part of said equalizer.

However Vanderhelm teaches setting said at least one adjustable coefficients comprises for an equalization of amplitude of said channel setting at least one coefficient of a symmetric 5-tap Finite Impulse Response filter part of said equalizer (¶0072).

Therefore taking the combined teachings of Tapia and Howard with Vanderhelm as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Vanderhelm into the method of Tapia and Howard. The motivation to combine Vanderhelm, Howard and Tapia would be to remove noise (¶0072 of Vanderhelm).

Re claim 24, the claimed limitations recited have been analyzed and rejected with respect to claim 10.

Re claim 38, the claimed limitations recited have been analyzed and rejected with respect to claim 10.

5. Claims 12, 13, 26, 27, 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285) and Howard (US20060209881) in view of Alhava ("Time-Domain Equalizer for Filter Bank-Based Multicarrier Communications", 2002 IEEE, pages 184-188).

Re claim 12, the modified invention of Tapia fails to teach use of the method for each of a plurality of sub-channels of a filter bank based multicarrier system or of a transform based multicarrier system.

However Alhava teaches using an equalization method for each of a plurality of sub-channels (page 184 left side fifth paragraph, OFDM is well known to have multiple sub-channels) of a filter bank based multicarrier system (page 184 right side third paragraph) or of a transform based multicarrier system.

Therefore taking the combined teachings of Tapia and Howard with Alhava as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Alhava into the method of Tapia and Howard. The motivation to combine Alhava, Howard and Tapia would be to provide resistance against narrowband interference (Abstract of Alhava).

Re claim 13, the modified invention of Tapia fails to teach use of the method for each of a plurality of sub-channels of a filter bank based multiantenna system or of a transform based multiantenna system in a Multiple Input Multiple Output configuration.

However Alhava teaches using an equalization method for each of a plurality of sub-channels (page 184 left side fifth paragraph, OFDM is well known to have multiple sub-channels) of a filter bank based multiantenna system or of a transform based multiantenna system in a Multiple Input Multiple Output configuration (page 184 right side fourth paragraph).

Therefore taking the combined teachings of Tapia and Howard with Alhava as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Alhava into the method of Tapia and Howard. The motivation to combine Alhava, Howard and Tapia would be to provide resistance against narrowband interference (Abstract of Alhava).

Re claim 26, the claimed limitations recited have been analyzed and rejected with respect to claim 12.

Re claim 27, the claimed limitations recited have been analyzed and rejected with respect to claim 13.

Re claim 40, the claimed limitations recited have been analyzed and rejected with respect to claim 12.

Re claim 41, the claimed limitations recited have been analyzed and rejected with respect to claim 13.

6. Claims 14, 28, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tapia et al (US5555285) and Howard (US20060209881) in view of Kabel et al (US20040042557).

Re claim 14, the modified invention of Tapia fails to teach use of the method for channels which are to be processed in an analysis-synthesis filter bank configuration.

However Kabel teaches using an equalization method for channels which are to be processed in an analysis-synthesis filter bank configuration (§0032).

Therefore taking the combined teachings of Tapia and Howard with Kabel as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the steps of Kabel into the method of Tapia and Howard. The motivation to combine Kabel, Howard and Tapia would be to allow high performance signal detection (§0032 of Kabel).

Re claim 28, the claimed limitations recited have been analyzed and rejected with respect to claim 14.

Re claim 42, the claimed limitations recited have been analyzed and rejected with respect to claim 14.

Allowable Subject Matter

7. Claims 4, 18, and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **LEON-VIET Q. NGUYEN** whose telephone number is

(571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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